

THE INTERRELATION BETWEEN THE REPRODUCTIVE PERFORMANCE AND THE DAIRY PRODUCTIVITY LEVEL OF THE MOLDAVIAN BLACK SPOTTED CATTLE BREED POPULATION OF “SOUTH” SUBTYPE

Vera GRANACI, Alisa MORARI-PÎRLOG

Moldavian State Agricultural University, Kishinev, 42 Mircești , 2049, Kishinev, Moldova;
Phone: + 37 31 22 56, E-mail: granaci@yahoo.com

Corresponding author email: granaci@yahoo.com

Abstract

The age of preparing the young cattle for reproduction and also cattle production and reproduction performances depending on the age of the first insemination, the main reproductive indices of cows and the influence of the season on the main reproductive indices in the studied population of cattle was studied. The investigations have been performed in terms of producing activity of the cattle breeding farm of the Moldova's south districts, using a group of Black Spotted cattle breed population of Moldavian “south” subtype. It wasn't established a regularity of the influence of the first insemination age on the reproductive indices and milk productivity level of the primiparous heifers of the Black Spotted cattle breed of Moldavian “south” subtype. The reduction of cow reproductive indices takes place only when milk productivity level exceeds 7000 kg per normal lactation compared with the maximum allowed requirements. The length of the service-period increased by 46,25%; The length of the calving interval increased by 3,97%; The coefficient of cow reproductive capacity decreased by 1 %. The value of the main reproductive indices of the studied group of cows manifested specific features depending on the season: The intensity of estrum manifestation prevails in the spring-summer period and constitutes 69,57% of the total females in heat during the year; The length of the service-period exceeds the maximum allowed requirements in the autumn-winter period; The best results of female fecundity have been established in the autumn and spring periods.

Key words: Black Spotted cattle breed population of Moldavian “south” subtype, reproductive indices, milk productivity level, service-period, calving interval, cows' reproductive capacity.

INTRODUCTION

The reproduction of farm animals is the basic component of the animal breeding, management and production obtaining technology. From a generally biological point of view, the reproduction ensures the continuity of animal species and breeds.

The success of farms and/or farmers it's up to an optimal fecundity. The fecundity optimization of the cow' dairy effective suppose a permanent control of a multitude factors which influence on the functionality of reproductive system. The decisive conditions for increase results of the fecundation suppose a profound knowledge of external and internal factors on the hormonal circulation.

In accordance with the multiple factors which influence realization of the reproductive function in cows, we purposed to study the

interrelations between the reproductive indices and milk productivity level of the Moldavian Black Spotted cattle breed population of “south” subtype.

MATERIAL AND METHOD

The investigations have been performed in terms of producing activity of the cattle breeding farm of the some south district, using a group of Black Spotted cattle breed population of Moldavian “south” subtype.

The cow heat cycle was identified by observations of female behaviour and specific signs of excitation. The artificial insemination or introduction of semen in cows was performed by the recto-cervical method using the frozen-thawed semen in polymer straws. For the insemination, there have been used only the samples presenting at least 40% (4

points) of sperm with advancing rectilinear movements.

The primary information concerning the production and reproduction performances was obtained as a result of studying the primary zoo-technical evidence of the technician-operator's activity. In order to accomplish the established objectives we assessed the following indices:

- *Milk productivity* assessed according to:
 - ✓ The amount of milk per normal lactation;
 - ✓ Average percentage of fat content in milk per normal lactation;
 - ✓ The amount of fat per lactation.
- *Reproduction performances*, assessed using the following parameters:
 - ✓ The age of the first insemination;
 - ✓ The length of the service-period;
 - ✓ The length of the calving interval;
 - ✓ Coefficient of used reproductive capacity of cows.

The length of the calving interval was calculated analyzing technician's evidence concerning the artificial inseminations according to the following formula:

$$CI = SP + G;$$

in which: CI – the calving interval (days); SP – the length of the service-period; G – the length of the gestation period.

The service – period represents the interval (days) from parturition till the beginning of gestation.

The length of gestation represents the period from the insemination till calving. It was determined according to the results of technician's records regarding the artificial inseminations. Fecundity percentage represents the rate of successfully inseminated females from the total number of inseminated females in a certain period of time and it was established using the formula:

$$F \% = 100 [(AG + J) : (AI + \hat{IV})];$$

in which: F % is the percentage of fecundity; (AG + J) – pregnant cows and heifers; (AI + \hat{IV}) – inseminated cows and heifers.

The coefficient of cows' reproductive capacity was determined using the formula:

$$CCR = 365 : CI,$$

in which: CCR – the coefficient of cows reproductive capacity; 365 – the optimal

period of the calving interval (days); CI – the calving interval de facto (days).

Statistical processing of the experimental results was computed by mathematical analysis of the biological phenomena [1].

RESULTS AND DISCUSSIONS

Physiologically mature are considered the young animals that have normally developed genital organs and that have reached about 65 – 70% of the adult animals body development of the same breed. The age of physiological maturity establishment is influenced by many internal genetically determined factors and also by a variety of external factors. We tried to evaluate the reproduction age (the age when young cattle reach their physiological maturity) and also the age of the first calving of the Black Spotted heifers of Moldavian "south" subtype (Tab. 1).

Table 1. The performances concerning the physiological maturity and first calving of the Black Spotted heifers of Moldavian "south" subtype

Nr. d.o.	Specification	Number of used animals	$\bar{X} \pm m_{sc}$ months	C_v , %
1	The age of the first insemination	95	$19,00 \pm 0,23$	5.4
2	The age of the first calving	82	$28,00 \pm 0,022$	3.66

The analysis of data presented in table 1 proves that in the breeding and feeding conditions created within this farm, the age of heifers used for reproduction is of 19 months. When comparing this age with data from literature [6], we found out a slight difference: + 1 month. Therefore, the breeding and management conditions of heifers raised for reproduction require certain improvement measures. The age of heifers' first calving in the studied group is of 28 months. The reduction of the first calving age (less than 30 months) and of the calving interval (less than 400 days) also ensures an intensification of the rhythmicity of the total livestock number increase.

According to fig. 1 we can conclude that most of the animals (36,37%) have been successfully inseminated at the age of 18 months, 27,26% of them have been used for reproduction at the age of 19 months and,

simultaneously, 36,38% of them have been inseminated at the age of 20 – 21 months.

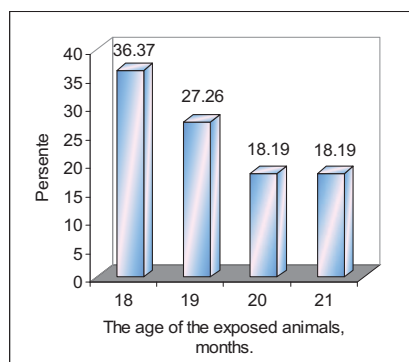


Fig. 1. Dynamics of using young cattle for reproduction

These data exceed significantly the optimal period of using young cattle for reproduction. The age when young cattle must be used for reproduction has a special importance on the economic future of cattle breeding as they will ensure the production only 3-5 months later.

Table 2. Productive and reproductive performances of the “south” subtype Moldavian Black Spotted cattle breed population of primiparous

Age of the first insemination, months	Milk quantity per first lactation, kg	The medium percentage of fat content, %	The amount of fat per first lactation, kg
18	5785,00 ± 500,26	3.71 ± 0.03	214,69 ± 1,89
19	5329,50 ± 179,59	3.73 ± 0.03	200,94 ± 7,22
20	5071,00 ± 291,08	3.70 ± 0.06	187,31 ± 9,12
21	6339,00 ± 739,07	3.67 ± 0.05	232,12 ± 24,72

The data presented in table 2 prove that milk productivity per first lactation exceeds the data anticipated by the suggested standard in order to create the breed regardless the age of heifers used for reproduction. The maximum amount of milk per normal lactation is obtained from primiparous heifers,

inseminated at the age of 21 months. The lowest results of this index were established in the group of primiparous heifers inseminated at the age of 20 months.

As for the percentage of fat content, it can be mentioned a homogeneity of this index regardless the age of young cattle, used for reproduction. The difference between them exceeds the standard value.

The amount of fat per first lactation is higher in the case of heifers that were inseminated at the age of 21 months. Therefore, the cattle population raised within the public farm shows a high productive potential exceeding the standard requirements.

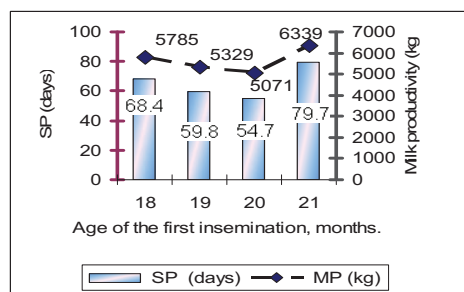


Fig. 2. Milk productivity and length of the service periode in correlation with the age of the heifes' first insemination

Considering the reproductive performances we can mention that the service-period varies from 54,7 days in the group of primiparous heifers inseminated for the first time at the age of 20 months up to 79,7 days in the group of those used in the breeding cyclogram at the age of 21 months. In this case there was a dependency between the amount of milk obtained per normal lactation and length of the service-period. Thus, the primiparous heifers inseminated for the first time at the age of 21 months, which recorded the highest amount of milk per lactation also recorded the longest service-period (Fig. 2). And correspondingly, the primiparous heifers inseminated at the age of 20 months recorded the lowest results of milk productivity and also the shortest service-period.

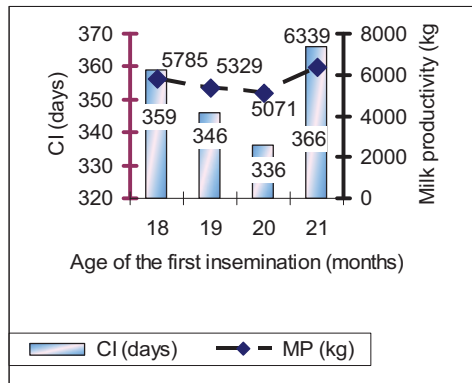


Fig. 4. The length of the service period and the length between calvings depending on the level of productivity (record lactation)

In accordance with the length of the service-period we observed the same regularity of the length of the calving interval. The lowest results were established in the group of primiparous which were inseminated at the age of 20 months – 336 days, while in the case of primiparous heifers inseminated at the age of 21 months the length of the calving interval is the highest - 366 days (fig. 3). The coefficient of cows' reproductive capacity use varies from 1,00 up to 1.05.

The data obtained regarding the productivity performances per first lactation and also the reproductive performances confirm the data from literature concerning specific interrelations between milk productivity level and reproduction values.

On the other hand we can mention that the activity of staff responsible for the organization of the reproduction process is at an appropriate level as all the indices fall into the limits of the minimum allowed requirements.

On the basis of obtained data and information we can mention that the reproductive indices and milk productivity level are influenced, preponderantly, both by genetic factors and by fodder and management conditions and to a lesser extent by the age of first insemination.

In order to increase cattle livestock number and improve their breeding conditions, the reproduction represents a biological feature and a technico-organizational method contributing directly to this purpose [2; 5; 4].

But the achievement of certain reproductive indices depends on specific peculiarities of the breed and also on the method these ones are integrated in the breeding and management technique.

In the field of cattle breeding, the data regarding problem solving of interdependencies between milk productivity and reproductive performances have a long history and continue to be targeted by specialists because productivity growth is evolving.

Data from literature emphasize that the productivity of the Black Spotted cattle breed is higher compared with its contemporary Red Steppe breed but they lose in terms of qualities [3; 7].

Given that the Black Spotted cattle breed of Moldavian "south" subtype was created by absorption crossbreeding of the Black Spotted breed with the local Red Steppe breed, we tried to evaluate the retro influences between milk productivity level and reproductive indices of the studied population. The figure 4, presents production and reproduction performances of the studied group of animals (per record lactation).

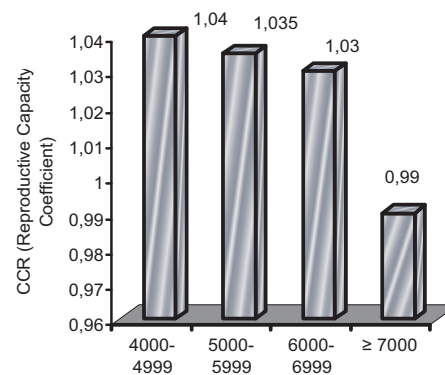


Fig. 5. The coefficient of cows' reproductive capacity depending on the milk productivity level (record lactation)

The analysis of data presented in Fig. 5 proves that milk productivity level influences to some extent cows' reproductive capacity. Thus we can mention that the lowest results were established in the group of cows

recording the productivity of more than 7000 kg of milk per lactation.

Based on the obtained results we noticed that the reproductive indices of the cow population of Black Spotted cattle breed population of Moldavian “south” subtype depend on milk productivity only after a certain level. The critical value of milk productivity indicating a trend of reduction of the main reproductive indices was the one exceeding 7000 kg of milk per lactation with the average fat content in milk of 3,65%.

The functioning of the genital apparatus is influenced by numerous internal and external factors[9; 8; 3]. The table 5 presents the practical results obtained within the animal breeding farm during the year 2011.

The data indicated in the table 3 prove that the indices of reproductive activity reduce in the autumn months. The biggest number of calvings was recorded in spring and winter and it begins to reduce in the summer period reaching its minimum values in autumn. The number of normal calvings reduced in autumn.

The rhythm of female heat cycle manifestation during the year is of great interest because it influences the uniformity of obtaining production during the year, maintenance of the sale price stability, insurance of the milk processing enterprises activity and market supply with dairy products at affordable prices

Data presented (tab. 3) reveal that the activity of cow genital apparatus is intensified in the spring-summer period. Beginning with autumn the number of in heat and fertile inseminated females reduces sharply and increases again in winter.

Percentage data regarding heat cycle manifestation in the studied population of cows prove that out of those 253 studded inseminations, 42,69% have been performed in spring, 26,88% in the summer months and the lowest percentage of inseminations was recorded in the winter season.

Table 3. The influence of the season on certain reproductive indices of cows population of Black Spotted cattle breed population of Moldavian “south” subtype

Specification	Winter	Spring	Summer	Autumn
1. Number of calvings: (heads)	80	90	60	18
%	33.61	37.81	25.21	7.5
including:				
- normal (%)	90.00	92.22	93.3 3	72.22
- dystocia (%)	3.75	2.22	1.67	22.22
- fetal retentions: %	6.25	5.56	5.00	5.56
2.Percentage of fecundity, %	80.95	93.52	83.82	97.15

The presented data (tab. 3) prove that cow fecundity rate varies from 80,95% up to 97,15%. The best results of female fecundity have been recorded in the autumn season. In spring there is a tendency of fecundity reduction. In the summer months, when high temperatures prevail, the fecundity rate reduced to 83,82%. The lowest results of cows and heifers fecundity have been recorded in the winter months.

Further, we evaluated the influence of the season on the length of the service-period. The obtained results are presented in figure 6.

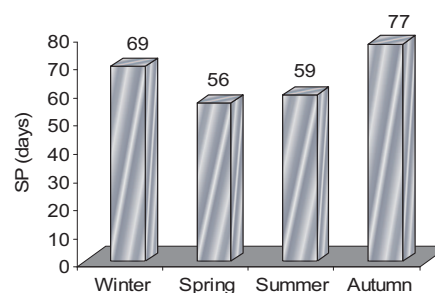


Fig. 6. The influence of the season on the length of the service-period of cows and heifers of the Moldavian “south” subtype Black Spotted cattle breed

According to presented data it can be noticed that the longest service-period was recorded in the autumn months. During the winter this index begins to decrease. The lowest results have been recorded in the spring-summer period.

CONCLUSIONS

It wasn't established a regularity of the influence of the first insemination age on the reproductive indices and milk productivity level of the primiparous heifers of the Black Spotted cattle breed of Moldavian "south" subtype, therefore we can mention that the age of physiologically mature young cattle prepared for reproduction has a great importance on the economic future of the cattle livestock.

The reduction of cow reproductive indices raised within the APC takes place only when milk productivity level exceeds 7000 kg per normal lactation compared with the maximum allowed requirements.

- the length of the service-period increased by 46,25%;
- the length of the calving interval increased by 3,97%;
- the coefficient of cow reproductive capacity decreased by 1 %.

The value of the main reproductive indices of the studied group of cows manifested specific features depending on the season:

- the intensity of estrum manifestation prevails in the spring-summer period and constitutes 69,57% of the total females in heat during the year;
- the length of the service-period exceeds the maximum allowed requirements in the autumn-winter period;
- the best results of female fecundity have been established in the autumn and spring periods.

In order to increase the zoo-economic balance of the Black Spotted cattle breed population of Moldavian "south" subtype it is recommended to take into consideration in terms of breeding and selection measures the peculiarities characterizing the interrelations between the established reproductive performances and milk productivity level and also to further deepen the study of this topic.

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